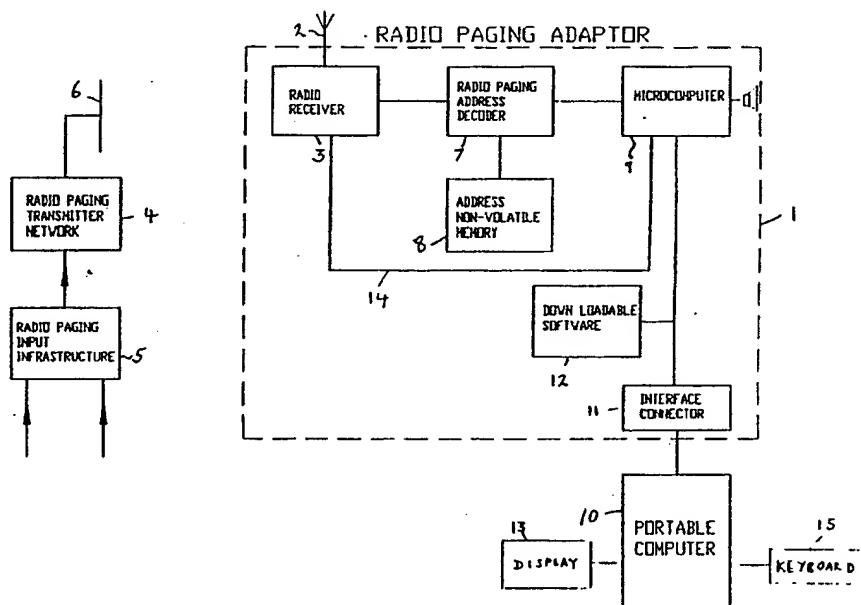




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(54) Title: RADIO PAGERS



(57) Abstract

A radio pager (1) comprises an aerial (2) connected to a radio receiver (3) for receiving information transmitted by a radio paging network (4). Information received by the radio pager (1) can be communicated to a micro-computer (9) linked with a portable computer (10). The micro-computer (9) and so-called portable computer (10) are operative for processing information received by the radio pager (1) and operative for manipulating data contained within the transmitted information and for responding to the data in dependence upon whether part or all of the data satisfies a desired condition.

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RADIO PAGERS

This invention relates to radio pagers for use in conjunction with radio paging networks.

Conventional radio pagers which are presently available merely receive and display transmitted data in the form it is received, the display being in audio, visual or hard copy form. This limits the versatility of conventional radio pagers.

It is an aim of the present invention to provide a radio pager which can perform an operational function on received data thereby offering a greater degree of flexibility in the way the transmitted data is received and displayed.

According to the present invention there is provided a radio pager for use on a radio paging network, the radio pager comprising: a receiver for receiving the information transmitted via the network; comparison means for comparing an address signal contained within the transmitted information with an address code(s) stored within the radio pager which identifies the radio pager; a processor means for processing the data when the address signal corresponds to the address code(s), for manipulating data contained within the transmitted

for generating instruction signals for instructing the processor to respond in a predetermined manner when part or all of the data satisfies the desired condition. That is to say, the portable computer may conduct a manipulative function on the data either alone or in addition with the processor.

The portable computer is preferably programmable thereby enabling variation of the desired condition which must be met before the data is manipulated and the processor carries out the response, and/or enabling variation of the manipulated function carried out on the data, and/or variation of the nature of the response made by the processor.

In preferred embodiments, the characteristics of the "desired condition", the processing and manipulative function, and the response are contained or defined in the programming software.

In preferred embodiments of the invention, communications between the radio pager and the portable computer are synchronised with transmissions received by the radio pager. That is to say, the radio pager is operative for switching off or for reducing the activity of the portable computer during receipt of transmissions

and for switching the portable computer on again when there are no transmissions received by the radio pager. The purpose of this is to eliminate or at least reduce the risk of interference occurring between the portable computer and the radio pager.

If a radio pager which has an internal aerial for receiving transmissions is connected to or placed near computer based equipment, its performance may be severely impaired by the radio frequency emissions from the computing equipment. By controlling embodiments of the invention so that operation of the portable computer is conducted during the period when signals are not received by the radio pager, the need to provide the radio pager and/or portable computer with extensive screening and filtering is at least substantially eliminated.

As would be apparent to a skilled man in the art, a pocket radio pager employs battery economising techniques which cause the radio pager to be turned off during periods where transmission has no relevance to that pager (ie. during periods where address or message code words are intended for other pagers). The portable computer is preferably arranged to operate during these periods.

In radio paging systems using the "POCSAG" coding

system, batches of calls are sent out on a regular cycle of, for example once every fifteen seconds. As only a proportion of this cycle is used up for the transmission of data, the portable computer can be operational during the remaining time. If the regular cycle is predetermined or can be deduced by monitoring the transmissions over a period of time, the portable computer can be activated during the period when no transmissions are expected to be received by the radio pager.

The transfer of data between the radio pager and the portable computer is also effected during the periods that the radio receiver of the pager is turned off (ie. not receiving transmitted information).

A visual display may be provided on the radio pager and/or the portable computer for displaying data received and processed by the radio pager.

The radio pager may be provided with a memory for storing data contained in the transmitted information when the address signal corresponds to the address code.

The processor of the radio pager and the portable computer may be programmed so that the desired condition

is recognised to occur when data received by the radio pager has a predetermined relationship (such as form and sequence) with information stored in the memory of the radio pager or a memory within the portable computer, the portable computer being operative for, for example: maintaining (in the memory of the radio pager or memory of the personal computer) independent databases for storing messages; selectively searching, deleting, saving and displaying data stored in the databases; or updating the information stored in the memory by the received data.

The "desired condition" may be for example, data relating to a particular subject, eg. stock market information. Receipt of this information is recognised by the radio pager or portable computer and initiates running of a sub-programme stored in the pager or computer. The sub-programme can be such as to update, for example, stock market prices which are already stored in a memory of the radio pager or portable computer. Hence, in this case, the operational function or manipulation is the act of updating the stock market prices in the memory.

The programming of the processor and/or portable computer may be such that the radio pager is capable of responding to received data in other ways:

A) by identifying a particular form of received data as relating to an appointment date and time, and in response to the identification, entering the appointment time and date into an electronic diary contained within the radio pager or portable computer;

B) by identifying a particular form of received data as relating to the setting of an alarm to activate a beeper and/or a sub-programme at a future time;

C) to allow the invention to receive, process and display encrypted, compressed or binary data;

D) to allow information received to be date stamped;

E) by disabling future operation of the radio pager or of certain programmed functions thereof when predetermined data is received.

The radio pager may comprise software store means for storing programming software which can be transmitted or "loaded down" to the portable computer when the radio pager is connected thereto via the interface. The programming software may be such as to set up or programme the portable computer so that it is capable of receiving data from the processor of the radio pager.

The software may be such as to enable the portable computer to generate appropriate instruction signals, thereby enabling the processor to respond in an appropriate manner when the received data satisfies the desired condition.

The portable computer may also comprise computation means and an alpha-numeric keyboard for performing mathematical computational functions.

An indicator means (for example a bleeper) may be provided within the radio pager or portable computer for indicating to the user receipt of data which satisfies the desired condition or one of several possible desired conditions.

The processor of the radio pager or the portable computer may be operative for running sub-programmes in response to one or more particular identification codes (or Radio Identity Codes RIC). For example, as discussed above the sub-programme may relate to a specialist operation such as the presentation of specialist information (ie. stock market share prices) transmitted from a radio paging transmitter network.

The radio pager or portable computer may comprise a

further sub-programme which is run when the radio pager receives a corresponding identification code in the received signal. This further sub-programme may be operative for changing or deleting one or more of the identification codes or Radio Identity Codes stored in the pager. It is therefore possible to enable or disable one or more pagers in a group of pagers from receiving particular specialist information.

This may be applied in the case where, for example, it is desired to control the pagers which can receive say share prices of the top thirty shares in the stock market. Receipt of this information would be recognised by the radio pager upon receipt of one of the identification codes. This would set up the sub-programme which would run therefore enabling the radio pager and portable computer to respond to this information and update share prices stored in the memory of the radio pager or personal computer and display the new share prices accordingly. If it were desired that a given radio pager should no longer receive this particular information (for example, for security reasons or because the owner of the pager has not paid his bill) the transmitting party would be able to instruct that pager to set up the further sub-programme upon receipt of another identification code. This

further sub-programme would be operative for changing or erasing the identification code corresponding to the stock market service from the pager. Once this is done, the radio pager could no longer receive stock market information until the further sub-programme is run again and instructed by the information received by the radio pager to reinstate the identification code corresponding to the stock market information.

This identification code may be a Radio Identity Code but may alternatively be a specific form and sequence of data (for example "A;") which is held in a table within the memory of the pager.

Numerous applications of this facility can be envisaged. For example, a group of radio pagers may be capable for running sub-programmes in response to receipt of a predetermined identification code, or RIC or, for example a sequence or data such as "A;", which sub-programmes (when run) would validate or invalidate credit card numbers held within the memory of the radio pager or portable computer. In the event that it were desired to invalidate a credit card number stored in the memory of the radio pager, the appropriate identification code could be transmitted to specified radio pagers so as to run the sub-programme whereupon

the credit card could be validated or invalidated according to the form of the data received by the radio pager.

Embodiments of the invention have the advantage that they are capable of acting upon information received to perform a pre-programmed data manipulating function thereby providing a radio pager having a considerable degree of flexibility.

The invention will now be further described by way of example with reference to the accompanying drawing which illustrates a schematic radio pager embodying the present invention.

A radio pager 1 comprises an aerial 2 connected to a radio receiver 3 for receiving information transmitted by a radio paging transmitter network 4. The network 4 receives information from a radio paging input infrastructure 5, the network 4 and infrastructure 5 operating according to principles known in the art. The radio information is transmitted by an aerial 6 and may use one of many standard radio paging coding formats, for example, CCIR radio paging code number 1 transmitted at 512 or 1200 baud.

The transmissions may occur with a frequency band of, for example, 130 to 150 MHz.

The radio pager 1 includes a radio paging address decoder 7 for decoding radio paging signals received by the radio receiver 3 and for comparing an address signal contained in the received radio paging information with an address code (ie. identification code) which identifies the radio pager 1. The address code is stored in an address non-volatile memory 8 of the radio pager 1. In the event that the address code is identical to the address signal code transmitted, the radio paging address decoder 7 activates the radio pager 1 so that the transmitted data can be received by a microcomputer 9. The microcomputer 9 can communicate with a portable computer 10 which is detachably connected to an interface connector 11 of the radio pager 1.

The radio pager 1 is provided with a down-loadable software PROM 12 which is operative for programming the portable computer 10 when the interface connector 11 is connected to the portable computer.

The portable computer 10 may be, for example, a "Psion Organiser II" (trade mark of Psion PLC). In this case,

the radio pager is plugged into the "top slot" facility of the Organiser II. The portable computer 10 is provided with a display 13 for displaying data received by the radio pager 1. The portable computer 10 is operative for performing the mathematical, and other data manipulative functions of a conventional electronic computer. Naturally, the portable computer 10 is provided with an alpha-numeric keyboard. In addition to this, the portable computer 10 is capable of performing the following functions:

1. processing and storing of information in a number of different storage media;
2. interface with varied other input devices such as magnetic swipe readers or bar code readers;
3. interfacing with varied other output devices such as printers or modems;
4. executing computer programmes written on or for the portable computer;
5. maintaining a real time clock.

The radio pager 1 is provided with control lines 4 for transmitting information relating to their status

(ie. whether transmissions are being received) of the radio receiver. This information is transmitted to the microcomputer 9 which is operative for controlling activation of the portable computer 10 in such a manner that the portable computer 10 is activated when the radio receiver 3 is not receiving transmissions from the transmitter network 4.

CLAIMS

1. A radio pager for use on a radio paging network, the radio pager comprising: a receiver for receiving the information transmitted via the network; comparison means for comparing an address signal contained within the transmitted information with an address code(s) stored within the radio pager which identifies the radio pager; a processor means for processing the data when the address signal corresponds to the address code(s), for manipulating data contained within the transmitted information, and for responding to the data in dependence upon whether part or all of the data satisfies a desired condition; and an interface connector for enabling detachable connection of the processor to a portable computer.

2. A radio pager according to claim 1 wherein the processor means is operative for running a programme for facilitating the manipulation of the data, the manipulative function being determined by the form of the programme.

3. A radio pager according to claim 2, wherein the programme is stored in the processor means.

4. A radio pager according to claim 2, wherein the characteristics of the desired condition, the processing and manipulative function, and the response are contained or defined in the programming software.

5. A radio pager according to any one of the preceding claims comprising a memory for storing data contained in the transmitted information when the address signal corresponds to the address code.

6. A radio pager according to any one of claims 1 to 5 comprising means for determining whether transmissions are being received by the radio pager and for controlling operation of the portable computer so as to switch off or at least reduce the activity of the portable computer when transmissions are received by the radio pager and so as to switch on the portable computer when no transmissions are received.

7. A portable computer in combination with a radio pager according to any one of claims 1 to 6, wherein the portable computer is operative for receiving the data from the processor means and for generating instruction signals for instructing the processor means to respond in a predetermined manner when part or all of the data satisfies the desired condition, and is programmable

thereby enabling variation of the desired condition which must be met before the data is manipulated and the processor means carries out the response, and/or enabling variation of the manipulated function carried out on the data, and/or variation of the nature of the response made by the processor.

8. A portable computer in combination with a radio pager according to claim 7, the combination being programmable so that the desired condition is recognised to occur when data received by the radio pager has a predetermined relationship with information stored in the memory of the radio pager or a memory within the portable computer, the portable computer being operative for maintaining independent data bases for: storing messages; selectively searching, deleting, saving and displaying data stored in the data pager; or updating the information stored in the memory by the received data.

9. A portable computer in combination with a radio pager according to claim 8, wherein the desired condition is data relating to stock market information.

10. A portable computer in combination with a radio pager according to claim 9, wherein receipt of the stock

market information is recognised by the radio pager or portable computer and initiates running of a sub-programme stored in the pager or computer, the sub-programme being such as to update stock market prices which are already stored in a memory of the radio pager or portable computer.

11. A portable computer in combination with a radio pager according to any one of claims 7 to 10, wherein the combination is capable of responding to received data in any one of the following ways:

(a) by identifying a particular form of received data as relating to an appointment date and time, and in response to the identification, entering the appointment time and date into an electronic diary contained within the radio pager or portable computer;

(b) by identifying a particular form of received data as relating to the setting of an alarm to activate a bleeper and/or a sub-programme at a future time;

(c) to allow the combination to receive, process and display encrypted, compressed or binary data;

(d) to allow information received to be date stamped;

(e) to disable future operation of the radio pager or of certain programmed functions thereof when predetermined data is received.

12. A portable computer in combination with a radio pager according to any one of claims 7 to 11, comprising software store means for storing programming software which can be transmitted or "loaded down" to the portable computer when the radio pager is connected thereto via the interface.

13. A portable computer in combination with a radio pager according to claim 12, wherein the programming software is such as to set up or programme the portable computer so that it is capable of receiving data from the processor means or the radio pager.

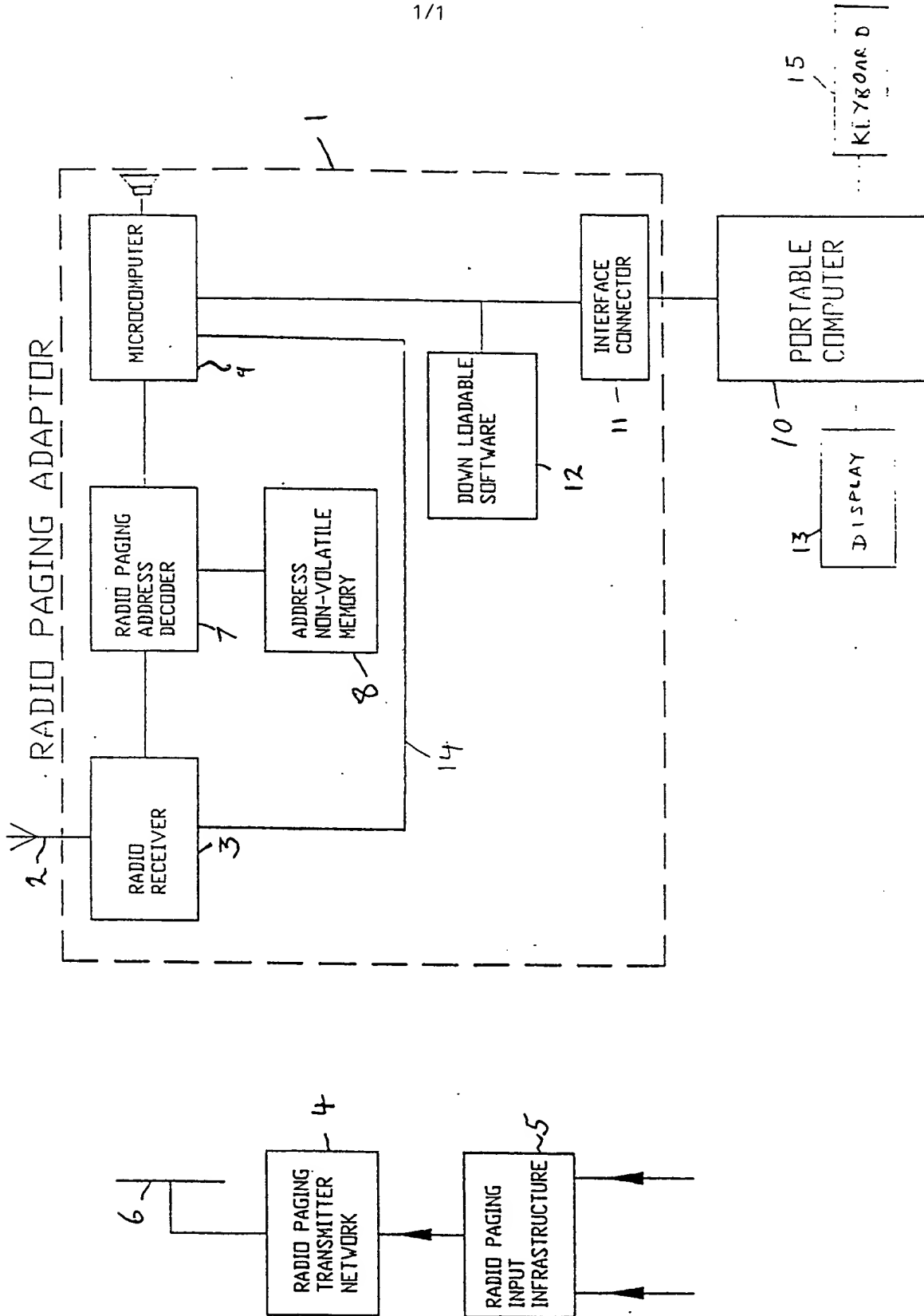
14. A radio pager and portable computer combination according to claim 12 or 13, wherein the software is such as to enable the portable computer to generate appropriate instruction signals, thereby enabling the processor means to respond in an appropriate manner when the received data satisfies the desired condition.

15. A radio pager and portable computer combination according to any one of claims 7 to 14, comprising computation means and an alpha-numeric keyboard for performing mathematical computational functions.

16. A radio pager substantially as hereinbefore described with reference to the accompanying drawing.

17. A radio pager and portable computer combination substantially as hereinbefore described with reference to the accompanying drawing.

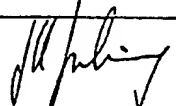
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INTERNATIONAL SEARCH REPORT

International Application No.

PCT/GB 90/00588

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC ⁷		
Int.Cl. 5 H04Q7/02 ; G08B3/10		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
Int.Cl. 5	H04Q ; G08B ; G06F	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	EP,A,231866 (NEC CORP.) 12 August 1987 see the whole document ---	1
X	EP,A,232123 (NEC CORP.) 12 August 1987 see column 1, line 25 - column 2, line 10 see column 2, line 37 - column 4, line 40 see column 6, line 11 - column 7, line 25 ---	1-6
X	PATENT ABSTRACTS OF JAPAN vol. 10, no. 50 (E-384)(2107) 27 February 86, & JP-A-60 204133 (NIPPON DENKI K.K.) 15 October 85, see the whole document ---	1
Y	---	7-15
Y	WO,A,8809104 (NEWSPAGER CORP.) 17 November 1988 see page 4, line 1 - page 10, line 25 see page 11, lines 18 - 36 ---	7-15
	--- -/--	
<p>¹⁰ Special categories of cited documents :</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
18 JULY 1990	10.08.90	
International Searching Authority	Signature of Authorized Officer	
EUROPEAN PATENT OFFICE	GERLING J.C.J. 	

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category "	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	US,A,4525865 (MEARS) 25 June 1985 see column 1, line 45 - column 2, line 5 ---	7-15
A	NEC RESEARCH AND DEVELOPMENT. special issue 1985, TOKYO JP pages 65 - 72; Y.NAKAMURA ET AL.: "Mobile Workstation" see page 66, paragraph 3 - page 68, paragraph (C) see page 71, paragraph (Bs) - A) ---	1-15
A	ELECTRONICS. vol. 56, no. 17, 25 August 83, NEW YORK US pages 142 - 145; J.KREBS: "Portable computer and host talk over radio-frequency link" see page 143, right-hand column, line 32 - page 144, right-hand column, line 25 ---	1-15

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.**

GB 9000588

SA 36344

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on
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18/07/90

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US-A-4525865	25-06-85	None	
